

## ABSTRACT

A rotary module for implementing a high frequency pressure swing adsorption process comprises a stator and a rotor rotatably coupled to the stator. The stator includes a first stator valve surface, a second stator valve surface, a plurality of first function compartments opening into the first stator valve surface, and a plurality of second function compartments opening into the second stator valve surface. The rotor includes a first rotor valve surface in communication with the first stator valve surface, a second rotor valve surface in communication with the second stator valve surface, and a plurality of flow paths for receiving adsorbent material therein. Each flow path includes a pair of opposite ends, and a plurality of apertures provided in the rotor valve surfaces and in communication with the flow path ends and the function ports for cyclically exposing each said flow path to a plurality of discrete pressure levels between the upper and lower pressures for maintaining uniform gas flow through the first and second function compartments.